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WHAT THE ELECTRICIAN WANTS.

Modern Electric Practice. Edited by Prof. Magnus Maclean. New edition. In six volumes. Vol. i., pp. xii+302. Vol. ii., pp. vii+351. Vol. iii., pp. viii+340. Vol. iv., pp. vii+314. Vol. v., pp. vi+293. Vol. vi., pp. vii+362. (London: The Gresham Publishing Co., 1909.) Price, the six volumes, 54s.

A PUBLICATION of so ambitious a character as that which now lies before us courts severe criticism. Six handsomely bound volumes, which would adorn any bookshelf, beautifully printed on excellent paper, and copiously illustrated with still more excellent illustrations, should be, like Cæsar's wife, above suspicion. The indolent reviewer may well feel aghast when confronted with "a comprehensive treatise" which "no single writer could hope to issue," and which has consequently been compiled by "the cooperation of contributors, each of whom is an expert in his own department of study and practice"; and the editor may well comfort himself against the possibility of adverse criticism by the reflection that what no one man can write no one man can review—a comforting reflection and a true one; but therein lies the paramount necessity for being above suspicion; for, unable to criticise all, the reviewer must perforce base his judgment on selections, and if, perchance, those selections are unfavourable, good work runs the danger of being condemned merely on the strength of its association with bad, and the "experts" as a body stand or fall according as some amongst them have or have not proved worthy of their trust.

Let us, however, in the first place venture some criticism of the work as a whole. A publication such as this challenges comparison with a number of independent treatises, and in one respect at least it should be superior. Careful editorship should secure, not only no unnecessary overlapping, but also uniformity of treatment. When reviewing the first three volumes on their original appearance five years ago, the writer pointed out that the statement in the preface that the contributors had all been allowed to use their own units amounted simply to an admission of slipshod editing. We regret to find that statement still standing. But in our former review we directed attention to a more serious error, namely, that at different places different values were given to the same quantities. We have turned again to the two tables to which we referred, and find them unchanged, the editor being still apparently unable to make up his mind whether the conductivity of platinum is greater or less than that of iron. We pity the student or the engineer who consults such data as these for trustworthy information. It is a well-known rule of conduct when a number of people agree to disseminate incorrect information that the precise nature of the information is of less importance than that all should be agreed upon it; we think this rule should

be borne in mind when the third edition is issued, if it is not found possible to obtain a correct table of conductivities.

Discrepancies such as these once discovered, suspicion is aroused, and one turns to individual articles to consider each on its merits. Here, as is naturally to be expected, one encounters varying degrees of merit. Some of the articles are well written, sound, and comprehensive monographs; others are exceedingly weak. We do not profess to have carefully read all, but can only judge the bulk by the average of those we have studied carefully, and it must be confessed the average is low.

Take, for example, the subject of primary batteries; the references in the index raised considerable hopes, but after they were traced we came to the reluctant conclusion that the index conveyed almost as much information as the articles. Primary cells are dealt with in section i., part i., chapter viii. Their treatment occupies five pages, about one-third being woodcuts (Figs. 58 and 59, by the way, being crossed). The particulars given are most meagre; neither the E.M.F. nor the internal resistances are given, and one has no idea whether the Leclanché cell, for example, gives 1 volt or 100; no particulars of life or output are given, and there is no comparison between the efficiency of different types. Dry cells are referred to in half a line, which conveys no impression whatsoever as to what they are like. Primary batteries are, it is true, again referred to in vol. vi., in the article on electromedical appliances, but only incidentally, and though the E.M.F.'s are mentioned here in one or two cases, this is about the only additional information given. The most elementary five-shilling textbook with the same ground to cover gives more valuable information on this subject than this comprehensive treatise written by experts; and it cannot be claimed that the primary battery is of no importance, as it is still enormously used for telegraph and telephone work, the consumption in England running into several millions a year.

Or, turn again to wireless telegraphy: this is not quite so easy as it sounds, for the entries under this heading in the index are of no use. There are two, of which one draws a blank, and the other leads to a casual reference to the subject in the article on secondary batteries. Under telegraphy we fare no better, but the recollection of the somewhat unfamiliar name of radiotelegraphy eventually leads us on the right track, only to find a bare five and a-half pages allotted to the subject. It is needless to say that no adequate treatment can be given in this space, even though one-half of it is occupied by diagrams. It is difficult to reconcile this with the allocation of four-and-forty pages to the description of electric fittings.

There is one respect in which a publication such as this is liable to compare unfavourably with the individual treatise—it is more difficult to keep up to date. If one branch of electrical engineering shows specially rapid development, it is easy for a treatise which deals with that branch alone to be revised or rewritten; but a production such as this is not likely to be revised when only one or two of its sections call

loudly for revision. This is the always recurrent objection to the encyclopædia, which applies with special force to an encyclopædia of so progressive an industry as the electrical. If any real attempt is to be made to maintain such a publication in the front rank, it can only be done by very frequent and thorough revision. We have certainly no ground for complaint in the present instance on the score of frequency of revision—a new edition within four years of the original issue is as much or even more than could be expected—but some of the contributors do not appear to have taken the duty of revision with sufficient seriousness, and thus, whereas some of the articles have been entirely rewritten, others in which progress has certainly been no less marked appear to have been scarcely altered.

We need make no apology in this connection for referring to the articles on electric lamps. Probably in no other branch of the electrical industry has there been more startling progress during the past three or four years. Often though the expression is abused, it is true in this instance to say that both arc lighting and incandescent lighting are being revolutionised. The article on incandescent lamps has been brought well up to date, and the information given on metallic filament lamps, if not so full as some could hope, is as full as could be expected in relation to an industry still carried on with more or less secrecy; but the article on arc lamps appears to be untouched. We have the gravest suspicion that the author does not realise what the flame arc really is; if he does, he signally fails to convey a correct impression to his readers, and, at the best, his treatment of the flame lamp is grossly inadequate.

In reviewing one of the volumes on its first appearance we ventured to suggest that, in view of the generally inferior standard of the letterpress as compared with the illustrations, the latter should be published without the former. The publishers appear to have adopted this suggestion to the extent of attaching to the inside of the back covers of some of the volumes ingenious little folding paper models of electrical apparatus to which we have been unable to trace any reference in the text. Many a pleasant half-hour may be spent by the student of electrical engineering, unable to obtain access to real electrical apparatus, in unfolding these models and trying to fold them up again in the correct order.

We are at a loss what to say in conclusion; we suppose that, so long as there is a large number of engineers anxious to write, and several willing to read, there will be an output of treatises, good, bad, and indifferent; but, personally, we have a strong disposition against buying in bulk, taking the good with the bad, "as they come," in the phrase of the market.

The beneficent uncle anxious to make a suitable gift to a budding electrical engineer may find in these volumes a useful outlet for surplus wealth, but the discriminating student will be well advised to make other investments. We can well imagine that there will be many, when confronted with so imposing an array of information in so handsome a guise, who will

be unable to believe that the matter can be less good than the manner; but we are loth to think that it is a comprehensive treatise such as this which really represents what the electrician wants.

MAURICE SOLOMON.

THE THERMODYNAMICS OF THE EARTH.

Radio-activity and Geology. By Prof. J. Joly, F.R.S. Pp. xi+287. (London: A. Constable and Co., Ltd., 1909.) Price 7s. 6d. net.

THOSE who are acquainted with Prof. Joly's presidential address to Section C at Dublin last year will not be surprised at the appearance of this volume from his pen. One of the most remarkable chapters the scientific historian has yet to write is the story of the rapid progress of research into the phenomena of atomic instability. In the spontaneous disruption of atoms, showing itself in the phenomena of radio-activity, we have learned of a store of energy of immense magnitude hitherto undreamt of. The fact alone that atoms are unstable systems has enlarged immeasurably the scope of our speculations regarding all inorganic evolution, while the knowledge of the forces locked up in them has still more directly affected almost every department of science. It is impossible that the geologist should long remain indifferent to this new phase of scientific inquiry, and it is Prof. Joly's endeavour to show him that already he must give heed to its teachings, and to point out where attention must be given. As being himself an active investigator, able both as physicist and geologist, no one better qualified for the task could be found, and his work must be carefully considered by every thoughtful geologist, however much any of his conclusions may be controverted.

The volume is wisely opened with a couple of chapters in which the fundamental principles and methods of radio-active inquiry are simply but accurately explained. These we would especially commend to the reader who may be inclined to a not unnatural scepticism as to the trustworthiness of conclusions based on the investigations of quantities of material habitually measured in billionths of a gram. It is of the utmost importance, too, for the geologist to realise to what degree the intra-atomic changes are independent of physical conditions, and that such changes do not affect the atoms of radium alone, but in varying degrees those of many substances.

In the chapter on radium in the earth's surface materials we are supplied with fairly ample data on which to judge of the general distribution of this element and its associates in the rocks. It is a significant fact that the rarer an element the more uniformly it appears to be distributed in nature. In spite of the natural variation of the quantities in different rock-specimens, and of considerable divergence among the averages of different investigators, we are still left with the conviction that the almost uniform presence of radium in fairly well ascertained quantity throughout the earth's crust is assured, and may be safely assumed as a basis of speculation. The